

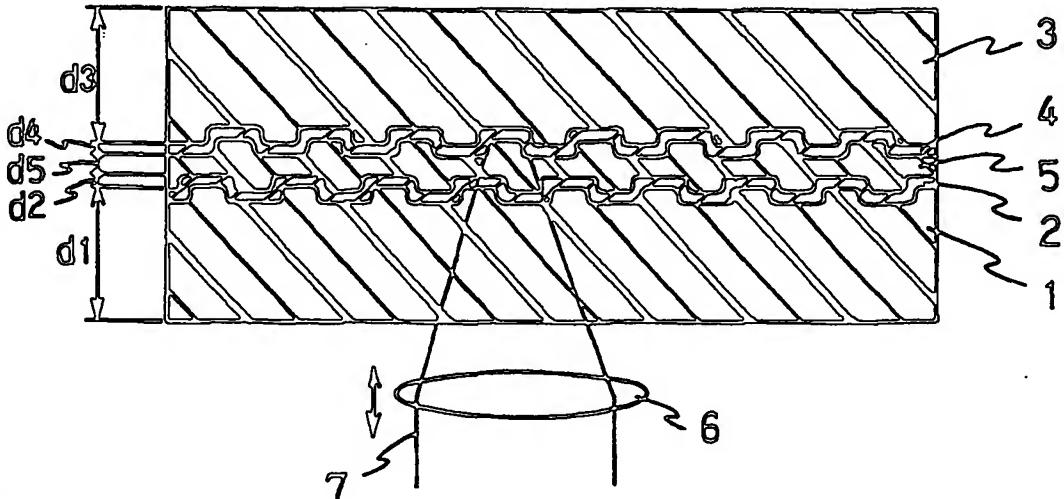
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G11B 7/00, 7/007, 7/09, 7/013, 7/24, 7/26		A3	(11) International Publication Number: WO 96/31875 (43) International Publication Date: 10 October 1996 (10.10.96)
(21) International Application Number: PCT/JP96/00973 (22) International Filing Date: 8 April 1996 (08.04.96)		(81) Designated States: CN, JP, KR, MX, SG, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(30) Priority Data: 7/82248 7 April 1995 (07.04.95) JP 7/214326 23 August 1995 (23.08.95) JP		Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
(71) Applicant: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. [JP/JP]; 1006-banchi, Oaza-kadoma, Kadoma-shi, Osaka 571 (JP).		(88) Date of publication of the international search report: 21 November 1996 (21.11.96)	
(72) Inventors: NISHIUCHI, Kenichi; 2-29-15-508, Okubo-cho, Moriguchi-shi, Osaka 570 (JP). NAGATA, Ken'ichi; 12-7, Kamino-cho, Nishinomiya-shi, Hyogo 663 (JP). AKAHIRA, Nobuo; 13-6, Otokoyama-kanaburi, Yawata-shi, Kyoto 614 (JP).			
(74) Agents: IKEUCHI, Hiroyuki et al.; Umeda Plaza Building, Room 401, 3-25, Nishitenma 4-chome, Kita-ku, Osaka-shi, Osaka 530 (JP).			

(54) Title: OPTICAL INFORMATION RECORDING MEDIUM, MANUFACTURING METHOD THEREFOR, MANUFACTURING APPARATUS THEREFOR, AND OPTICAL INFORMATION RECORDING AND REPRODUCING APPARATUS



(57) Abstract

In an optical information recording medium having at least two information layers, guide grooves for tracking or sample pits or information pits corresponding to information signals are formed on a surface of a first substrate (1). A first information layer (2) formed by a thin film for reflecting a portion of a light beam (7) made incident on the first substrate (1) and permitting penetration of a portion of the light beam (7) is formed on a surface of the first substrate (1). Guide grooves for tracking or information pits corresponding to information signals are formed on a surface of a second substrate (3). A second information layer (4) having a reflectance higher than that of the first information layer (2) is formed on a surface of the second substrate (3). Between the first information layer (2) and the second information layer (4), there is formed a transparent separation layer (5) for positioning the first information layer (2) and the second information layer (4) to be spaced a predetermined distance apart from each other.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 96/00973

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 G11B7/00 G11B7/007 G11B7/09 G11B7/013 G11B7/24 G11B7/26																							
According to International Patent Classification (IPC) or to both national classification and IPC																							
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 G11B																							
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																							
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)																							
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Category</th> <th style="text-align: left; padding: 2px;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="text-align: left; padding: 2px;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Y</td> <td style="padding: 2px;">US,A,4 450 553 (HOLSTER PETER L ET AL) 22 May 1984 see column 2, line 27 - line 33 see column 2, line 61 - line 65 see column 3, line 4 - line 11 see column 4, line 35 - line 44 see column 5; table 2 see column 5, line 28 - line 33 see column 7, line 49 - column 8, line 16 see column 8, line 8 - line 42 see column 10, line 31-63; figure 3 see column 8, line 17 - line 42</td> <td style="padding: 2px;">1,3-12, 17-19, 21,23-25</td> </tr> <tr> <td style="padding: 2px;">A</td> <td style="padding: 2px;">see column 10, line 31 - line 63; figure 3</td> <td style="padding: 2px;">2,20,22, 26</td> </tr> <tr> <td style="padding: 2px;">A</td> <td style="padding: 2px;">see column 9, line 28 - line 35</td> <td style="padding: 2px;">2,20,22, 26</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">---</td> <td style="padding: 2px;">2,20,22, 26</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">-/-</td> <td style="padding: 2px;">2,20,22, 26</td> </tr> </tbody> </table>						Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	US,A,4 450 553 (HOLSTER PETER L ET AL) 22 May 1984 see column 2, line 27 - line 33 see column 2, line 61 - line 65 see column 3, line 4 - line 11 see column 4, line 35 - line 44 see column 5; table 2 see column 5, line 28 - line 33 see column 7, line 49 - column 8, line 16 see column 8, line 8 - line 42 see column 10, line 31-63; figure 3 see column 8, line 17 - line 42	1,3-12, 17-19, 21,23-25	A	see column 10, line 31 - line 63; figure 3	2,20,22, 26	A	see column 9, line 28 - line 35	2,20,22, 26		---	2,20,22, 26		-/-	2,20,22, 26
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																					
Y	US,A,4 450 553 (HOLSTER PETER L ET AL) 22 May 1984 see column 2, line 27 - line 33 see column 2, line 61 - line 65 see column 3, line 4 - line 11 see column 4, line 35 - line 44 see column 5; table 2 see column 5, line 28 - line 33 see column 7, line 49 - column 8, line 16 see column 8, line 8 - line 42 see column 10, line 31-63; figure 3 see column 8, line 17 - line 42	1,3-12, 17-19, 21,23-25																					
A	see column 10, line 31 - line 63; figure 3	2,20,22, 26																					
A	see column 9, line 28 - line 35	2,20,22, 26																					
	---	2,20,22, 26																					
	-/-	2,20,22, 26																					
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.																							
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed																							
T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *&* document member of the same patent family																							
8 Date of the actual completion of the international search		Date of mailing of the international search report																					
6 September 1996		- 9, 10. 96																					
Name and mailing address of the ISA			Authorized officer																				
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016			Poth, H																				

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 96/00973

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 95, no. 003 & JP,A,07 073507 (TOSHIBA CORP), 17 March 1995, see abstract ---	1,3,4,6, 9,11,12, 17-19, 21,23-25 2,26
Y	US,A,4 917 751 (OHTA KENJI ET AL) 17 April 1990 see column 1, line 35 - line 50 see column 2, line 38 - line 57; figure 2 ---	23,24
Y	US,A,4 990 208 (KANO NOBUHIKO) 5 February 1991 see column 1, line 32 - line 39; figure 31 see figures 5,6,9,10; examples 1,4 ---	23,24
Y	EP,A,0 443 797 (SONY CORP) 28 August 1991 see column 4, line 6 - line 30; figure 1 see column 7, line 51 - column 8, line 50; figures 9-11; examples 4-6	23,24
A	see column 6, line 24 - line 28; figure 4; example 1 see column 7, line 51 - column 8, line 50; figures 9-11; examples 4-6 ---	27-31
A	US,A,5 318 653 (TOIDE YUKARI ET AL) 7 June 1994 see the whole document ---	23,24, 27-31
X	US,A,5 381 401 (BEST MARGARET E ET AL) 10 January 1995	32-35,37
Y	see column 3, line 59 - column 8, line 38; figures 2,4,7	32,
Y	see column 10, line 19 - line 58; figures 7,9 ---	34-36,38 32,34-36
Y	EP,A,0 426 409 (MATSUSHITA ELECTRIC IND CO LTD) 8 May 1991 see column 3, line 25 - line 31; figures 3-5 ---	32,35
Y	PATENT ABSTRACTS OF JAPAN vol. 012, no. 194 (P-713), 7 June 1988 & JP,A,62 298934 (MATSUSHITA ELECTRIC IND CO LTD), 26 December 1987, see abstract ---	36
Y	PATENT ABSTRACTS OF JAPAN vol. 010, no. 060 (P-435), 11 March 1986 & JP,A,60 202545 (NIPPON DENSHIN DENWA KOSHA), 14 October 1985, see abstract ---	36
		-/-

INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/JP 96/00973

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 351 (P-912), 7 August 1989 & JP,A,01 109537 (CANON INC), 26 April 1989, see abstract ---	36
Y	US,A,5 023 439 (NODA KAZUO ET AL) 11 June 1991 see column 4, line 49 - column 5, line 10; figures 4,5 ---	38
Y	US,A,4 815 060 (NOMURA SUSUMU) 21 March 1989 see the whole document ---	38
P,Y	US,A,5 449 590 (IMAINO WAYNE I ET AL) 12 September 1995 see column 5, line 62 - column 7, line 11 see column 9; table VI ---	3,4,6
Y	EP,A,0 605 924 (PHILIPS ELECTRONICS NV) 13 July 1994 see page 9, line 49 - line 50 see page 9, line 26 - line 35 see page 4, line 34 - line 48 ---	12,13
A A	see page 9, line 49 - line 50 see page 9, line 26 - line 35 see page 4, line 34 - line 48 ---	14-16 3,4,6
Y	EP,A,0 446 679 (MATSUSHITA ELECTRIC IND CO LTD) 18 September 1991 see abstract ---	5,7,8,10
Y	EP,A,0 556 107 (REXROTH SIGMA) 18 August 1993 see figure 2B ---	5,7,8,10
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 104 (P-842), 13 March 1989 & JP,A,63 282940 (SEIKO EPSON CORP), 18 November 1988, see abstract ---	12
A	see abstract ---	13
Y	US,A,3 855 426 (BOUWHUIS G) 17 December 1974 see column 3, line 28 - line 30; figure 3B ---	17
Y	US,A,4 188 433 (BROEK ARNOLDUS J M VAN DEN ET AL) 12 February 1980 see column 4, line 36 - line 40; figure ---	17
Y	EP,A,0 437 223 (MATSUSHITA ELECTRIC IND CO LTD) 17 July 1991 see column 6, line 55 - column 7, line 1 see column 7, line 22 - line 31 ---	10,11
8		-/-

INTERNATIONAL SEARCH REPORT

Inte. .onal Application No
PCT/JP 96/00973

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,5 126 996 (IIDA TETSUYA ET AL) 30 June 1992 see column 3, line 56 - line 68; figures 1,2 -----	12,13
A		14-16

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP 96/00973

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see continuation sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest The additional search fees were accompanied by the applicant's protest No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

1. claims 1,2,19-22:	stable medium;
2. claims 23-26:	manufacturing of a medium with an adhesive resin layer;
3. claims 27-31:	efficient production apparatus;
4. claims 32-38:	recording/reproduction apparatus;
5. claims 3,4,6:	appropriate reflectances and absorptions of the information layers;
6. claims 5,7,8:	appropriate layer structures for the information layers;
7. claims 9,12-18:	information reliefs;
8. claims 10,11:	reproducing-recording medium

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte.	onal Application No
PCT/JP 96/00973	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4450553	22-05-84	NL-A- 7803069 AT-B- 363701 AU-B- 525972 AU-B- 4534779 CA-A- 1149060 CH-A- 643387 DE-A- 2910390 FR-A- 2420811 GB-A,B 2017379 JP-C- 1363333 JP-A- 54130902 JP-B- 61027815 SE-A- 7902406	25-09-79 25-08-81 09-12-82 27-09-79 28-06-83 30-05-84 04-10-79 19-10-79 03-10-79 09-02-87 11-10-79 27-06-86 23-09-79
US-A-4917751	17-04-90	JP-C- 1764349 JP-B- 4053017 JP-A- 60239952 JP-C- 1764350 JP-B- 4053018 JP-A- 60239953	28-05-93 25-08-92 28-11-85 28-05-93 25-08-92 28-11-85
US-A-4990208	05-02-91	FR-A- 2606198 NL-A- 8702493 JP-A- 63239628	06-05-88 16-05-88 05-10-88
EP-A-0443797	28-08-91	JP-A- 3245329 AT-T- 129354 AU-B- 637866 AU-B- 7116191 CA-A- 2036715 DE-D- 69113833 DE-T- 69113833 US-A- 5378517 US-A- 5284538	31-10-91 15-11-95 10-06-93 29-08-91 23-08-91 23-11-95 04-04-96 03-01-95 08-02-94
US-A-5318653	07-06-94	JP-A- 3046138 JP-A- 3058334 DE-D- 69020027 DE-T- 69020027 EP-A- 0390413	27-02-91 13-03-91 20-07-95 09-11-95 03-10-90

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int'l. Application No	
PCT/JP 96/00973	

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-5318653		EP-A- 0624870 KR-B- 9402346 US-A- 5540967 JP-B- 2508336 JP-A- 3254438		17-11-94 23-03-94 30-07-96 19-06-96 13-11-91
US-A-5381401	10-01-95	US-A- 5255262 US-A- 5410530 US-A- 5513170 US-A- 5449590 CA-A- 2066004 CN-A,B 1067521 CN-A- 1090081 CN-A- 1114770 CN-A- 1120717 CN-A- 1120718 EP-A- 0517490 JP-A- 5151644 US-A- 5446723		19-10-93 25-04-95 30-04-96 12-09-95 05-12-92 30-12-92 27-07-94 10-01-96 17-04-96 17-04-96 09-12-92 18-06-93 29-08-95
EP-A-0426409	08-05-91	CA-A- 2028544 JP-B- 2503300 JP-A- 3219440 US-A- 5428597 US-A- 5303225		01-05-91 05-06-96 26-09-91 27-06-95 12-04-94
US-A-5023439	11-06-91	JP-C- 1842815 JP-A- 63257925 US-A- 5107102		12-05-94 25-10-88 21-04-92
US-A-4815060	21-03-89	DE-A- 3733422 GB-A,B 2196115		05-05-88 20-04-88
US-A-5449590	12-09-95	US-A- 5381401 US-A- 5255262 CA-A- 2134140 CN-A- 1112272 EP-A- 0658887 JP-A- 7201077 US-A- 5410530		10-01-95 19-10-93 16-06-95 22-11-95 21-06-95 04-08-95 25-04-95

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. onal Application No	
PCT/JP 96/00973	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5449590		US-A- 5513170 CA-A- 2066004 CN-A,B 1067521 CN-A- 1090081 CN-A- 1114770 CN-A- 1120717 CN-A- 1120718 EP-A- 0517490 JP-A- 5151644 US-A- 5446723	30-04-96 05-12-92 30-12-92 27-07-94 10-01-96 17-04-96 17-04-96 09-12-92 18-06-93 29-08-95
EP-A-0605924	13-07-94	CN-A- 1090668 JP-A- 6267110 US-A- 5511057	10-08-94 22-09-94 23-04-96
EP-A-0446679	18-09-91	CA-A- 2036853 JP-A- 4212735 KR-B- 9503182 US-A- 5130971 US-A- 5233599 US-A- 5289453	15-09-91 04-08-92 01-04-95 14-07-92 03-08-93 22-02-94
EP-A-0556107	18-08-93	FR-A- 2687193 JP-A- 6281028 US-A- 5279331	13-08-93 07-10-94 18-01-94
US-A-3855426	17-12-74	NL-A- 7103233 BE-A- 780451 CA-A- 953419 CH-A- 558053 CH-A- 558052 DE-A- 2209761 FR-A- 2129626 GB-A- 1387304 SE-B- 396493 US-A- 3999009	13-09-72 11-09-72 20-08-74 15-01-75 15-01-75 21-09-72 27-10-72 12-03-75 19-09-77 21-12-76
US-A-4188433	12-02-80	NL-A- 7713710 AU-B- 4235778 DE-A- 2853262	14-06-79 21-06-79 13-06-79

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No
PCT/JP 96/00973

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4188433		FR-A-	2411462	06-07-79
		GB-A-	2009996	20-06-79
		JP-A-	54089704	17-07-79
		SE-A-	7812634	13-06-79

EP-A-0437223	17-07-91	JP-B-	2514261	10-07-96
		JP-A-	3209642	12-09-91
		DE-D-	69118409	09-05-96
		DE-T-	69118409	14-08-96
		US-A-	5134604	28-07-92

US-A-5126996	30-06-92	JP-A-	2223030	05-09-90
		JP-B-	8023941	06-03-96
		DE-D-	68922185	18-05-95
		DE-T-	68922185	09-11-95
		EP-A-	0368442	16-05-90
		US-A-	5171392	15-12-92
